

SECTION 2.02
ROADWAY EXCAVATION, FORMATION OF
EMBANKMENT AND DISPOSAL OF
SURPLUS MATERIAL

2.02.01--Description: Roadway excavation shall consist of the removal and satisfactory disposal, in the manner herein required, of all material taken from within the limits of the work contracted for, the removal of which is necessary for the construction of the roadbed, subgrade, shoulders, slopes, entrances, retaining walls, gutters, channels and other miscellaneous construction to the dimensions and limits shown on the plans or as ordered and shall include the necessary excavation for pervious structure backfill outside of structure excavation limits. It shall also include the formation of embankments, the disposal of surplus or unsuitable material, removal of old foundations, concrete or masonry walls, crib walls, bin walls, stone wall fences or farm wall fences and filling of cellar or other holes, and in the absence of such items in the contract, the clearing and grubbing and the shaping and cleaning of slopes and of shoulders.

1--Classification: Roadway excavation shall be classified for the purpose of payment as "Earth," "Rock," "Channel Excavation--Earth," or "Channel Excavation--Rock," in accordance with the following definitions. The classifications applying to any particular project shall be as indicated on the proposal form.

Earth Excavation shall include all materials removed as indicated or directed except water, "Rock," "Channel Excavation--Earth," and "Channel Excavation--Rock."

Rock Excavation shall include rock in definite ledge formation and boulders, or the portion of boulders, one cubic meter or more, in volume.

Channel Excavation --Earth shall include all materials other than water or "Channel Excavation--Rock" removed from the existing new or temporary water courses as indicated on the plans or as directed.

Channel Excavation --Rock shall include rock in definite ledge formation and boulders of one cubic meter or more in volume removed from existing, new or temporary water courses, as indicated on the plans or as directed.

2.02.03--Construction Methods : Excavation shall be made in conformity with the requirements of the plans and as ordered by the Engineer. The Contractor shall, when necessary in excavation areas, provide and maintain ditches which are adequate to prevent free water from becoming incorporated in material to be used to form embankments, such ditching to be at the sole expense of the Contractor. Where buildings have been removed to clear the way for construction or where old foundations, concrete or masonry walls exist, they shall be removed to 600 mm below the directed or finished grading; and all cellar and other holes shall be filled with suitable material.

1--Sod and other organic matter shall be disposed of as directed by the Engineer. In the event the Engineer does not direct the disposal of unsuitable material in conformance with Subarticle 2.02.03-8, the Contractor has the option of disposing of the unsuitable material as specified within Subarticle 2.02.03-10.

2--Frozen material, otherwise suitable for formation of embankments, shall be placed on embankment slopes or disposed of as directed by the Engineer. The Engineer may direct the removal of any portion of an accepted layer which has become frozen after placement and compaction. This frozen material shall be placed on embankment slopes or disposed of as directed by the Engineer. The removal and placement of frozen material shall be at the sole expense of the Contractor.

3--Topsoil shall be excavated within pavement and shoulder limits at grade points and to an elevation 1 m below finish grade and elsewhere as directed. The material excavated may be used in the construction of embankments, if permitted by the Engineer, and shall be thus used if the Engineer so directs. In all cases, the use of topsoil in constructing embankments shall be restricted to locations where the surface of the underlying material is dry, its distance above the free water surface at the time of filling is more than 1 m, and its distance below finish pavement grade is more than 1.5 m.

4--Excavation of Rock: When rock is encountered, it shall be excavated to the slope lines and depths indicated on the plans.

The Contractor shall pre-split the rock along the proposed rock slopes to the lines and inclinations shown on the plans except as otherwise provided in the specifications. Pre-splitting will be required where the backslope is designed at an inclination one (vertical) on one (horizontal) or steeper or where the cut in rock is 3 m or more, measured on the inclination of the proposed slope from the bottom of excavation to the natural surface of sound rock. The maximum vertical height of slope face which can be pre-split at any one time shall be 15 m.

The pre-splitting holes shall follow the required rock slope lines and inclinations. Hole drilling shall commence only when solid rock is encountered and exposed to the satisfaction of the Engineer. Unless otherwise permitted by the Engineer, pre-splitting holes shall have a spacing of 1 m, center-to-center, and a diameter not greater than 75 mm. The holes shall be extended from the top of solid rock surface to the toe of finished rock slope, unless lesser depths are specified on the plans. The proper angle of drilling shall be maintained at all times so all pre-split holes lie essentially in the same plane and are paralleled to each other. No holes shall deviate more than 150 mm at any place in the plane of the specified slope line nor in its vertical alignment. If any cut is pre-split by vertical stages (lifts), the pre-split holes may be offset, for each stage, a distance not more than 600 mm inside the previously pre-split face. Pre-split holes shall be lightly loaded with a continuous column charge manufactured especially for pre-splitting. All space in each hole not occupied by the explosive charge shall be filled with clean stone chips less than 9 mm in size or approved equal. Charges near the top of hole shall be reduced sufficiently to eliminate overbreak and heaving. The top charge shall not be less than 1 m below the top of the drill hole. The methods of detonation shall be such that a uniform plane of rupture of the rock occurs from top to bottom and between pre-split holes. If necessary, the Contractor shall adjust the methods as outlined above so as to result in a uniform plane of rupture in the rock.

Unless otherwise approved by the Engineer, pre-split holes shall be drilled at least 15 m ahead of and shall be detonated prior to the drilling and blasting of the general pattern holes within the section of any lift of rock to be excavated. The pre-splitting shall be performed so as to produce a uniform plane of rupture in the rock such that the resulting rock face will not be affected by subsequent blasting and excavation operations.

In the general pattern, blasting following pre-splitting operations, no portion of any blast hole shall be drilled closer than 1.2 m to the pre-split face. No portion of any blast hole larger than 75 mm in diameter shall be permitted closer than 3.5 m to the pre-split face. The spacing of blast holes, distribution and type of explosives, methods of detonation, and the blasting techniques shall be adjusted by the Contractor according to the characteristics and structure of the rock encountered so as not to fracture the rock beyond the pre-split face.

Prior to any blasting, the Department will call a blasting conference at which the Contractor shall be represented to determine the methods to be used and the required protection to insure the utmost safety during blasting operations. The Contractor shall be responsible for all damage due either directly or indirectly to such operation.

The Contractor shall schedule his operations so that all rock excavation within a distance of 30 m of bridge or other large structures, or any portion thereof, is completed to the required slope lines and depths before any structure work is started.

All loose and unstable material, even if located beyond the payment lines, and all breakage and slices shall be removed as directed and as the excavation for each vertical stage (lift) progresses. It shall be, at all times, the responsibility of the Contractor to perform all phases of this work to produce the required rock slope faces to the satisfaction of the Engineer.

Where indicated on the plans or as ordered by the Engineer, rock shall be excavated without the use of explosives. Excavation methods by the use of drilling, splitting, wedging and/or other approved methods not involving the use of explosives shall be utilized. The method selected by the Contractor shall allow excavation to the slope line(s) and depth(s) as shown on the plans and shall not affect in any way the material or structures outside the excavation line or grade.

5--Placement of Embankment Material: All excavated material and reclaimed waste obtained within the limits of the project shall be used in the formation of embankments, except as provided elsewhere herein or as ordered by the Engineer.

Overhaul will not be allowed; but excavated material shall be transported where directed, provided the designated point of deposit is not more than 100 m beyond the limits of the work contracted for, unless stated otherwise in the special provisions or plans.

When embankments are to be constructed on slopes steeper than 1 vertical to 3 horizontal, the slope of the existing ground on which the embankment is to be placed shall be plowed deeply or cut into steps before the filling is begun.

Embankments shall be constructed of earth, rock, reclaimed waste or a mixture thereof containing no more than 2 percent by mass of asphalt cement. The embankment shall be constructed by depositing successive layers of fill for the full width of the embankment, unless a partial width is permitted by the contract documents or by the Engineer. If glass and/or clinker are included in reclaimed waste, their individual particles shall be no larger than 25 mm in size. Glass and/or clinker shall be thoroughly mixed with other embankment materials such that their content anywhere in the embankment shall not exceed 25 percent by mass, with the exception that material placed within 1.5 m from the face of the slope shall be free of glass and clinker. No embankment layer shall be deposited on surfaces of snow or ice, nor shall it be placed on frozen or unstable surfaces except under the conditions permitted elsewhere herein. If the Contractor is permitted to continue work, he shall remove, at no cost to the State, any frozen embankment material unless otherwise directed by the Engineer.

The depth of each layer, before compaction, shall not exceed 300 mm except as permitted hereinafter by these specifications, or with the permission of the Engineer.

The embankment shall be crowned or pitched to provide drainage at the close of each day's operations.

Where filling in 300 mm layers is impracticable as in the case of filling in water or over slopes too steep for the operation of equipment, the embankment may be constructed in one layer to the minimum elevation at which equipment can be operated, as determined by the Engineer; and above this elevation, the embankment shall be constructed as specified herein.

Embankments to an elevation 1 m above the free water surface at the time of filling, shall be constructed of rock or free-draining material, or a mixture of both. Free-draining material shall conform to the requirements of Article M.02.07.

In fills where the top of the proposed pavement will be less than 1.2 m above an existing flexible pavement, and the existing pavement is not required to be removed, it shall be scarified as directed by the Engineer.

In fills where the top of the proposed pavement will be less than 1 m above an existing concrete pavement, including all bituminous resurfacing thereon, the concrete pavement shall be removed.

In fills where the top of the proposed pavement will be between 1 m and 1.2 m above an existing concrete pavement, the concrete pavement shall be broken in such a manner that complete fractures are obtained. Intact fragments, undamaged after breaking, shall not be larger than 0.2 m².

When present pavement not in cut or fill is removed, as called for on the plans or directed, the area shall be backfilled with a suitable earth material which shall be free from admixture of subsoil, refuse, stumps, roots, rocks, brush, weeds and other material which will prevent the formation of a suitable seed bed.

Wherever portions of existing concrete pavement are to be removed, such removals shall be made to neat lines. The areas in which such concrete surfaces are to be removed will be delineated by the Engineer before such work is done. Where no break or joint exists in the concrete pavement at the line of delineation, a kerf, at least 50 mm but no more than 80 mm deep, shall be made in the concrete with an approved concrete cutting

saw. The concrete shall then be removed from within the delineated area exercising extreme care to avoid "breakbacks" beyond the kerf, break or joint. Concrete pavement remaining in place shall have vertical edges, and that portion below the kerf shall be reasonably smooth.

Wherever portions of existing bituminous concrete pavement are to be removed they shall be removed to neat lines. The areas in which such bituminous concrete surfaces are to be removed will be delineated on the plans or by the Engineer before the work is done. The line of delineation shall be cut by a method approved by the Engineer.

When the embankment material consists predominantly of rock fragments and/or fragments of reclaimed waste of such size that material cannot be placed in horizontal layers of the thickness specified above without crushing or further breaking down the pieces resulting from the excavation methods, such material may be placed in the embankments in horizontal layers not exceeding 1 m in thickness. Large stones or fragments of reclaimed waste shall not be placed in nests but shall be distributed over the area; and the interstices shall be filled with spalls, finer fragments or earth to form a solid, compact mass.

The entire area of each layer shall be leveled off by suitable grading equipment and shall be compacted as hereinafter specified.

In portions of roadway embankments where piles are to be driven, the Contractor shall not place any material which might interfere with pile driving operations. The correction of any condition which interferes with the pile driving operations in embankments constructed under the contract shall be made by the Contractor at no cost to the State.

No rockfill or reclaimed waste containing fragments over 300 mm in their greatest dimension shall be placed above an elevation which is 600 mm below the top of the embankment.

No particle over 130 mm in its greatest dimension shall be placed within 300 mm of the elevation of the top of the prepared subbase unless otherwise specifically authorized.

Prior to the formation of any embankment, the Contractor may submit a plan in a form acceptable to the Engineer for grading operations detailing the location of embankment material sources and points of deposit for the entire project in order to qualify for payment for overhaul as hereinafter provided. Failure to submit such a plan will be construed as a waiver of any and all rights to payment for overhaul.

6--Compaction: The entire area of each layer of the embankment and the subgrade in the excavated areas shall be uniformly compacted to at least the required minimum density by use of compaction equipment consisting of rollers, compactors or a combination thereof. Earth-moving and other equipment not specifically manufactured for compaction purposes will not be considered as compaction equipment.

The dry density after compaction shall not be less than 95 percent of the dry density for that soil when tested in accordance with AASHTO T 180, Method D. Each layer of the embankment and the subgrade shall be compacted at optimum moisture content. No subsequent layer shall be placed until the specified compaction is obtained for the previous layer.

7--Stability: If after full compliance with the requirements of these specifications with regard to excavation, placement and compaction density requirements, a stable embankment or subgrade has not been obtained, the Contractor shall proceed to perform such corrective work as is necessary to produce a stable embankment or subgrade. This work may include, but not necessarily be limited to control of moisture to within limits suitable for obtaining the required stability; blending with rock or granular material from roadway excavation or borrow, or free draining material or any combination thereof; removal and replacement with acceptably compacted material or a combination of these methods approved by the Engineer. Any of the foregoing methods may be supplemented by suspending embankment operations and allowing the material to dry.

When embankments are constructed of material from roadway excavation and the Engineer determines that the material properly compacted is not sufficiently stabilized, the cost of corrective measures directed by the Engineer shall be paid for at applicable contract unit prices, or in the absence thereof, as extra work.

If the corrective work on embankments constructed of roadway excavation is necessary, and requires departure from the plan for grading operations to obtain material at locations other than shown on the aforementioned plan which result in increased net costs to the Contractor, such increased costs will be paid as extra work, except that no payment will be made for overhaul for any corrective material for the first 1 km of increased hauling distance.

When embankments are constructed of borrow, they shall be stable. In this case however, the methods and material used to obtain such stability shall be determined by the Contractor and performed at his expense.

8--Surplus Excavated Material: All surplus excavated material shall be used where directed by the Engineer, to uniformly widen embankments, to flatten slopes, to fill low places in the right of way, or for such other purposes as the Engineer may direct, provided the area designated for deposit does not conflict with Subarticle 2.02.03-5.

Any surplus or unsuitable material not required, nor permitted to be used for such purposes, shall be disposed of in accordance with Subarticle 2.02.03-10.

9--Fences: The Contractor shall erect either the permanent or temporary fence, to the satisfaction of the Engineer, at all points where the land is used for pasturing and where the existing fences are affected by the grading operations. Permanent or temporary fences shall be erected prior to the removal or destruction of any part of the existing fence, and any temporary fence erected shall be removed when no longer required. There will be no direct payment for any temporary fence erected, but the cost thereof shall be considered as included in the cost of the grading operations; permanent fences will be paid for at the contract unit price for this item.

10--Disposal of Unsuitable Material: When the Engineer has not directed otherwise, the Contractor has the option to dispose of unsuitable excavated material by one or both of the following methods:

(a) By removing such material from within the limits of the highway and disposing of such material at point or points as the Contractor shall determine provided this does not create any detrimental effects to the project and the Engineer does not object to the area selected for disposal.

(b) By disposing of such material within the limits of the highway in accordance with the details and requirements shown on the plans and the following requirements:

Not less than fifteen days prior to disposing of any such material within project limits, the Contractor shall submit to the Engineer for his approval a proposal delineating the locations and extent of the areas in which he intends to dispose of such material. The proposal shall describe the nature of the material and the methods to be employed in placing and covering the material. The proposal will be reviewed for its effects on the completed construction and the environment of the highway. The proposal shall be amended as required by the Engineer. No such material shall be disposed of within project limits until the proposal has been approved by the Engineer.

All work shall be done in accordance with the approved proposal.

Suitable material excavated for the disposal of the unsuitable excavated material shall be placed in the embankment in accordance with the requirements of Section 2.02 or shall be used to cover the unsuitable excavated material.

The State does not guarantee nor imply that the areas available for disposal of unsuitable excavated material within project limits will be adequate for the disposal of all unsuitable excavated material to be removed. The Contractor shall dispose of all unsuitable excavated material in excess of that which can be placed within the permitted areas.

11--Slopes: Earth slopes with a degree of slope from 2:1 to 5:1 shall be tracked unless the Engineer directs that they shall not be tracked. Tracking shall consist of traversing the slopes with cleated tracks so that the cleat indentations are horizontal. Where topsoil is to be placed on slopes, the tracking shall be done prior to the installation of the topsoil.

Tracking is not to be construed to be used for slope compaction. Its sole purpose is to provide indentations in the slope to help reduce soil erosion. Other methods of achieving the desired results may be used, with the permission of the Engineer.

2.02.04--Method of Measurement: Payment lines for earth excavation shall coincide with the slope and subgrade lines or the top of the payment lines for ditch excavation, whichever applies, as shown on the plans or as ordered.

Payment lines for unsuitable material excavation shall be the area designated by the plans, special provisions or the Engineer as unsuitable material below the subgrade in cut sections, below the original ground line in fill sections and beyond the normal payment lines for ditch and channel excavation.

Unsuitable material within the slope and subgrade lines or the top of the normal payment lines for ditch and channel excavation shall be measured as earth excavation, ditch excavation or channel excavation.

Any stockpiling, drying or re-excavation necessary to utilize such material on the project shall not be measured for payment, but shall be included in the payment for unsuitable material.

Also measured for payment shall be the volume of earth moved in cutting or plowing of steps on steep slopes, as described in Article 2.02.03, and the removal of existing flexible pavement where shown on the plans or ordered by the Engineer.

The stockpiling, re-excavation and final placement of material will not be measured for payment, unless such has been made a part of the contract or unless the State has created conditions different from those that existed or could have been foreseen or anticipated when the contract was bid.

Payment limits for Channel Excavation--Earth shall coincide with the side slopes and bottom of channel as shown on the plans or as directed.

Payment lines for Channel Excavation-Rock shall coincide with the depth shown on the plans or to the depth ordered. Payment lines for slopes will be extended to a limit of 300 mm outside of and parallel to the slope lines shown on the plans, or as ordered, to include rock actually removed within this limit. In case of natural faults or fissures which make the removal of additional rock necessary for reasons of safety, or which produce slides clearly not attributable to the Contractor's method of operation, the slope payment lines will be fixed to coincide with the natural faults or fissures of the rock.

Payment lines for rock excavation, where pre-splitting bedrock is required by these specification, will extend to the slope and depth line shown on the plans or as directed, to include only the rock actually removed within this limit.

Payment lines for rock excavation, where pre-splitting bedrock is not required by these specifications, shall coincide with the depth shown on the plans or to the depth directed; and payment lines for the slopes will be extended to a limit of 300 mm outside of and parallel to the slope lines shown on the plans, or as directed, to include rock actually removed within this limit. Where removal of rock is necessary for reasons of safety or due to conditions clearly not attributable to the Contractor's method of operation, the payment lines will be fixed to coincide with limits ordered by the Engineer.

Pre-splitting of bedrock performed in accordance with these specifications will not be measured for payment.

Where removal of rock is necessary for reason of safety or due to conditions clearly not attributable to the Contractor's methods of operation, the payment lines for rock excavation where pre-splitting is required will be fixed to coincide with limits ordered by the Engineer. Payment lines for Rock Excavation (No Explosives), where mechanical means of removal are required by these specifications, will extend to the slope and depth line(s) shown on the plans or as directed, to include only the rock actually removed within these limits.

Concrete and masonry foundation walls, or portions thereof, to be removed will be measured for payment by the volume in cubic meters, in place, before removal.

Existing concrete pavement and concrete base over 4 m², including any bituminous surfacing material immediately thereon, shall be measured in place before removal.

Existing concrete and cement masonry structures over 1 m³, shall be measured in place before removal.

When rock is encountered, and its removal is to be paid for as "Rock Excavation" or "Channel Excavation--Rock," the Contractor shall strip or expose the rock to such an extent that in the Engineer's opinion the necessary measurements can be taken. The Contractor shall notify the Engineer at least 2 days prior to disturbing any of the rock to allow ample time to obtain the necessary measurements. If the Contractor shall fail to give such notice, or remove any rock prior to the taking of the measurements, the Engineer shall presume that measurements taken at the time he first sees the material in question will give a true quantity of excavation.

The amount of excavation will be determined by the method of average end areas.

The work of scarifying existing pavement will not be measured for payment, but the cost shall be considered as included in the general cost of the contract.

The work of cutting concrete pavement will be measured for payment by the number of meters of saw cut made with an approved concrete saw to the lines delineated by the Engineer on the concrete pavement.

The cutting of bituminous concrete pavement will be measured for payment by the number of meters of cut made by an approved method to the lines delineated on the plans or by the Engineer. Cuts made necessary by the Contractor's operation, such as, but not limited to, patching, bituminous concrete samples, continuance of previous runs, faulty work or faulty materials shall not be measured for payment. Bituminous driveways and parking areas are considered as bituminous concrete pavement.

The work, materials, tools, equipment and labor incidental to the disposal of unsuitable excavated material or breaking concrete pavement will not be measured for payment.

2.02.05--Basis of Payment: Roadway excavation will be paid for at the contract unit price per cubic meter for "Earth Excavation," "Rock Excavation," "Rock Excavation (No Explosives)," "Channel Excavation--Earth," or "Channel Excavation--Rock" as the case may be, in accordance with the classification given herein and subject to the method of measurement described above. The price shall include all equipment, tools and labor incidental to the completion of the excavation, the formation and compaction of embankments, and the disposal of surplus or unsuitable material in accordance with the provisions of the plans and of these specifications.

The removal of concrete pavement or concrete base will be paid for at the contract unit price per square meter for "Removal of Concrete Pavement," including any bituminous surfacing material immediately thereon.

The removal of concrete or cement masonry structures over one cubic meter, other than retaining walls or bridge structures, will be paid for at the contract unit price per cubic meter for "Rock Excavation" or "Unclassified Excavation," as the case may be.

The removal of drainage structures outside of the limits of Roadway and Structure Excavation will be paid for under the "Trench Excavation" items.

Concrete and masonry foundation walls or portions thereof ordered removed will be paid for at the contract unit price per cubic meter for "Rock Excavation" or "Unclassified Excavation," as the case may be.

The removal of retaining walls and bridge substructures will be paid for under the item "Removal of Existing Masonry."

The removal of crib walls, bin walls, stone wall fences or farm wall fences will be paid for as Earth Excavation.

The removal of all pavement or pavement bases other than concrete will be paid for at the contract unit price per cubic meter for "Earth Excavation."

The work of cutting concrete pavement will be paid for at the contract unit price per meter for "Cut Concrete Pavement" including any bituminous surfacing material immediately thereon, which price shall include all materials, equipment, tools and labor incidental thereto.

The work of cutting bituminous concrete pavement will be paid for at the contract unit price per meter for "Cut Bituminous Concrete Pavement" which price shall include all materials, equipment, tools and labor incidental thereto.

Unsuitable material excavation outside of the limits of earth, unclassified, ditch and channel excavation will be paid for at the contract unit price per cubic meter for "Unsuitable Material Excavation", which price shall include all equipment, tools, labor and material incidental thereto.

All costs incidental to the disposal of unsuitable excavated material will be included in the price for "Earth Excavation."

When no item for "Channel Excavation--Rock" appears in the proposal and rock, conforming to the description given under "Channel Excavation--Rock" in Article 2.02.01 is encountered in the channel excavation, the rock so encountered and removed will be classified and treated as "Channel Excavation--Rock," and its removal will be paid for at 300 percent of the contract unit price per cubic meter for "Channel Excavation--Earth."

All costs incidental to breaking concrete pavement will be considered as being included in the general cost of the contract.

Pay Item	Pay Unit
Earth Excavation	m ³
Rock Excavation	m ³
Channel Excavation--Earth	m ³
Channel Excavation--Rock	m ³
Cut Concrete Pavement	m
Cut Bituminous Concrete Pavement	m
Removal of Concrete Pavement	m ²
Unsuitable Material Excavation	m ³
Rock Excavation (No Explosives)	m ³